

A NEW SPECIES AND A NEW RECORD OF THE GENUS SIPHONOLAIMUS (NEMATODA, MONHYSTERIDA) FROM THE YELLOW SEA AND THE EAST CHINA SEA, CHINA

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Abstract A new species of free-living marine nematode of the genus *Siphonolaimus*, *S. boucheri* sp. nov. from the Yellow Sea is described and illustrated. This new species is characterized by the short spear (21–23 μm), head diameter 10–11 μm , amphids circular, 13 μm in diameter or 59% of corresponding body diameter, short spicules (61–65 μm , 1.33 abd) and absence of supplements. Tail conical, 3.57 abd (male) and 4.58 abd (female) long. Meanwhile, a new record of genus *Siphonolaimus* from the East China Sea, *Siphonolaimus profundus* is first reported in China. Types are deposited in the College of Marine Life Sciences, Ocean University of China.

Key words Free-living marine nematode, *Siphonolaimus*, new species, Yellow Sea, new record, East China Sea

1 Introduction

During the course of an ecological survey of the overwinter ground for anchovy in the Yellow Sea in January 2004, and also an investigation from the Changjiang (Yangtze River) Estuary and its adjacent waters in the East China Sea in June 2003, many previously undescribed species were encountered. These were studied at the Ocean University of China, Qingdao. Up to now, one new genus, more than 40 species of marine nematodes have been recorded from the Yellow Sea (Zhang and Platt, 1983; Zhang and Ji, 1994; Zhang *et al.*, 1994; Hope and Zhang, 1995; Huang and Zhang, 2004; Huang and Zhang, 2005; Zhang, 2005; Zhang and Huang, 2005) and Bohai Sea (Zhang, 1990, 1991, 1992; Guo, 2000). In comparison with the Yellow Sea, little of nematode fauna has been known in the East China Sea (Hua and Zhang, 2005). In this paper we described a new species, *Siphonolaimus boucheri* sp. nov. from the Yellow Sea, and a new record *Siphonolaimus profundus* from the East China Sea.

2 Material and Methods

Specimens of *Siphonolaimus boucheri* sp. nov. were collected from stations 14394 and 126194, the Yellow Sea during the January cruises in 2004. Specimens of *Siphonolaimus profundus* were collected from stations 8, the East China Sea during the June cruise in 2003.

Benthic sediment samples were taken using a 0.1 m² improved Gray-O'Hara box corer, and meiofauna subsamples were taken using sawn-off syringe tube with a 2.6 cm inner diameter, pushed into the sediment down to 8 cm depth whilst

withdrawing the plunger to avoid core compression. Samples were stratified by 0–2, 2–5, 5–8 cm and fixed with 5% formalin in seawater respectively. In the laboratory, the samples were stained with 0.1% rose Bengal for more than 24 h. Then all the samples were washed on a 31 μm sieve for the lower size limit and a 500 μm sieve for the upper size limit to remove the formalin. Ludox-TM was used to extract meiofauna from sediment by centrifugation. Each sample was washed into a lined Petri dish and the meiofauna was sorted under a stereo microscope to higher taxonomic levels. Nematodes were transferred into 9:1 (v/v) solution of 50% alcohol-glycerol in an embryo dish to slowly evaporate to pure glycerol and then mounted on to a permanent slide (McIntyre and Warwick, 1984). The descriptions have been made from glycerine mounts using interference contrast microscopy. Drawings were made with the aid of a camera lucida. Morphometric data are presented using the modification of Filipjev's standard formula described by Platt (1973). The types are deposited in the College of Life Science and Technology, Ocean University of China. Measurements are in μm . Abbreviations are as follows: a, body length divided by maximum body diameter; abd, anal body diameter; abe, anterior body end; amph D, amphid diameter; b, body length divided by pharyngeal length; BL, body length; c, body length divided by tail length; c', tail length divided by anal body diameter; cbd, corresponding body diameter; CSL, cephalic setae length; E-ab, excretory pore from anterior body end; HD, head diameter; M, maximum body diameter; NR-ab, nerve ring from

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the anterior body end; ph L: pharyngeal length; ph ebd: pharyngeal end body diameter; Sa: spicule length as arc; Sc: spicule length as chord; s' : spicule length as chord divided by anal body diameter; s'' : spicule length as arc divided by anal body diameter; TL: tail length; V: vulva distance from the anterior end of body; V%: position of vulva as percentage of body length from anterior end

3 Description

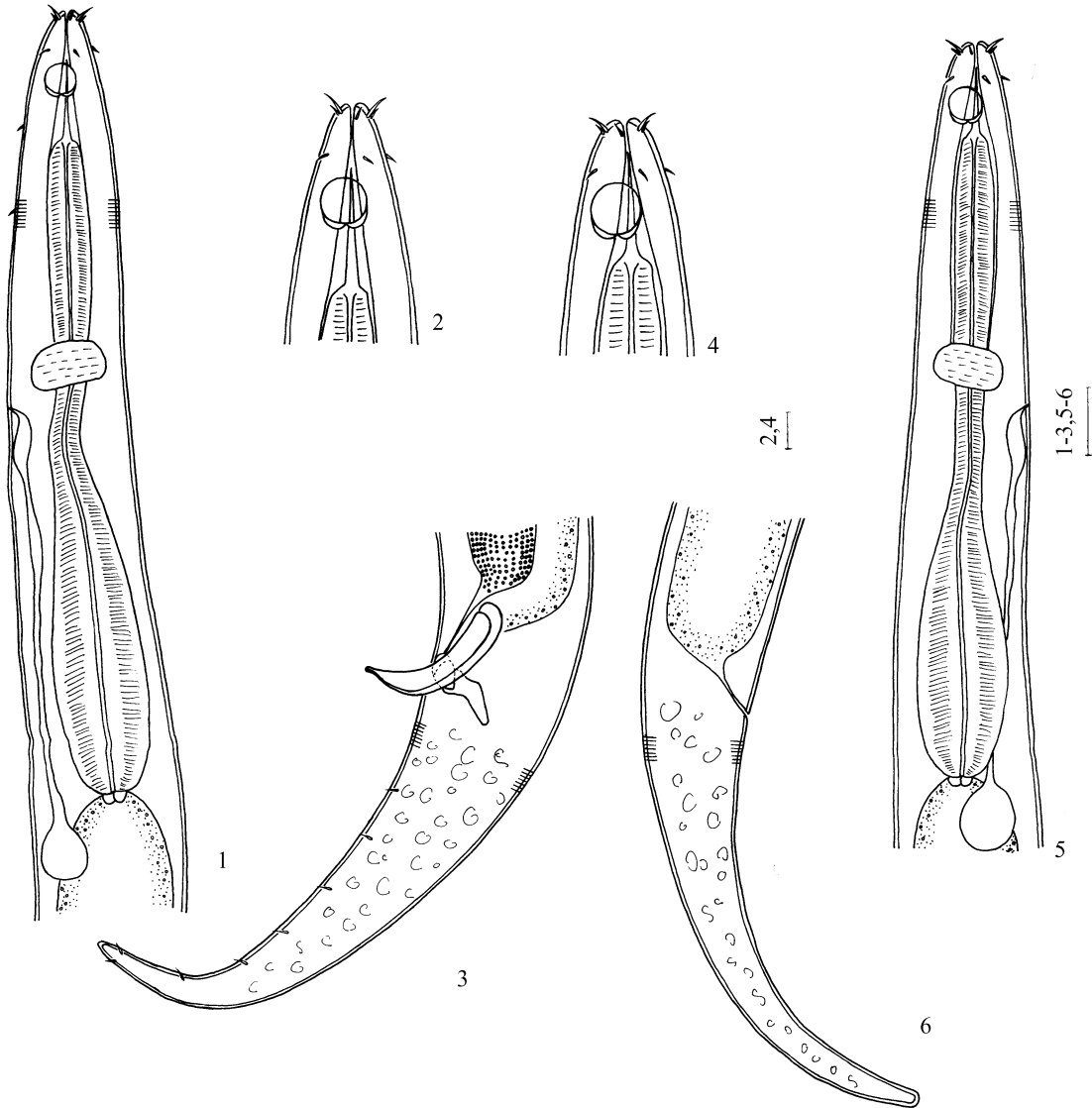
Order Monhysterida

Family Siphonolaimidae

Genus *Siphonolaimus* De Man, 1893

Siphonolaimus boucheri sp. nov.

Holotype male (Slide number ZB040141 Station 14394). Paratypes: one males (Slide number ZB040142 Station 14394) and one female (Slide number ZB040143 Station 126194).



Figs 1-6 *Siphonolaimus boucheri* sp. nov. 1 ♂, pharyngeal region 2 ♂, anterior body region 3 ♂, copulatory apparatus and tail 4 ♀, anterior body region 5 ♀, pharyngeal region 6 ♀, rectal region and tail Scale bars 1, 3 5-6= 20 μm; 2, 4= 10 μm.

Type locality and habitat: Sublittoral in the Yellow Sea Station 14394 (33°N, 124°29'E; water depth 64 m), Mdø 3.59, silt-clay 46.2%, two males collected during Jan. 2004 cruise; Station 126194 (34°N, 124°26'E; water depth 84 m), Mdø 6.54, silt-clay 73.02%, one female collected during Jan. 2004 cruise.

Etymology. This species is named in honour of Professor Guy Boucher.

Measurements

1 ♂ = 270 M 6325 6500 μm; a = 92.9 b = 24.1, c = 37.1, $c' = 3.57$, $s'' = 1.33$ Sa = 65

$$1\text{♀} = \frac{1252 \ 3750 \ 5285}{10 \ 47 \ 65 \ 33} 5 \ 450 \ \mu\text{m}; \ a = 83.3 \ b =$$

$$21.6 \ c = 33.3 \ c' = 4.58 \ V\% = 68.8\%$$

For other measurements see Table 1.

Table 1. Measurements of *Siphonolaimus boudieri* sp. nov. (in μm).

Characters	1 ♂	2 ♂	1♀
BL	6 500	6 850	5 450
M	70	68	65
a	92.9	100.7	83.8
b	24.1	25.8	21.6
c	37.1	40.3	33.3
HD	11	11	10
HD /ph cbd (%)	22.9	22.4	21.2
CSL	8+3	8+3	7+2.5
CSL/HD (%)	0.73	0.73	0.7
amph-abc	16	16	16
amph D	13	13	13
amph D / dcd (%)	0.59	0.59	0.59
NR	112	108	104
NR cbd	40	40	38
NR /Ph (%)	41.5	40.8	41.3
ph L	270	265	252
Ph cbd	48	49	47
E-abc	132	120	110
E cbd	41	41	39
V	—	—	3 750
V %	—	—	68.8
Va lva c d	—	—	65
Sc	52	50	—
Sa	65	61	—
s' (Sc/abd)	1.06	1.09	—
s'' (Sa/abd)	1.33	1.33	—
apophosis	23	19	—
TL	175	170	165
abd	49	46	36
c' (TL/abd)	3.57	3.7	4.58

Description. Male. The body is extremely long total body length 6 500-6 850 μm , maximum body diameter is 68-70 μm . Head diameter 11 μm and 22.4%-22.9% of diameter at the end of pharynx.

The cuticle is marked by very fine striations. The head with six short (about 3 μm) and four long (8 μm , 73% of head diameter) cephalic setae. Circle of six subcephalic setae about 3 μm long at the level of the anterior border of amphids. Short somatic setae sparse in mid-body region, more on tail.

The amphids are basically circular in outline, but their margin is considerably expanded along the

posterior edge, where the amphidal nerve exits 13 μm diameter or 59% of corresponding body diameter, 16 μm from anterior. The buccal cavity is typical of the genus, containing a short cuticularized axial spear, 21-23 μm or 8.5% of pharynx length. The spear enlarged gradually to the posterior end.

The pharynx is 265-270 μm long, expanded posteriorly into an elongate bulb, about 90-95 μm long, maximum width 31 μm ; nerve ring at 108-112 μm from anterior body end or 41% of the pharynx. Excretory pore at 120-132 μm from anterior end at 45.3%-48.9% of the length of the pharynx. Cardia small. The intestine is full of small opaque black granules, as in many other species in the genus.

The reproductive system with a single outstretched testis, which lies left of the intestine. The spicules are paired and curved, distal arcuate, 61-65 μm (1.33 a b d) as arc. The gubernaculum with well developed dorsal apophyses, 19-23 μm long. The supplement is absent.

The tail is conical, 170-175 μm and 3.57-3.7 anal diameter.

Female. The female is similar to the male. The reproductive system is monodelphic with a single anterior outstretched ovary, which lies left of the intestine. Posterior uterus with four large and elongate eggs, the size (length \times breadth) from 149 $\mu\text{m} \times 52 \mu\text{m}$ to 110 $\mu\text{m} \times 50 \mu\text{m}$. Vulva at 68.8% of the body length. The ratio of 'c'' is larger than that of male (4.58 vs 3.57).

Differential diagnosis and discussion. The genus *Siphonolaimus* established by De Man, 1893 has the following characters: buccal cavity containing an axial spear and single outstretched anterior ovary. The new species *S. boudieri* sp. nov. is characterized by its rather short spear (21-23 μm), head diameter 10-11 μm , amphids 13 μm or 59% of cbd, short spicules (61-65 μm , 1.33 abd) and absence of supplements, tail conical, 3.57 (male) and 4.58 (female) abd.

S. boudieri sp. nov. is very close to *S. profundus* Warwick, 1973, *S. auratus* Wieser, 1956 and *S. smetti* Chen, 2000 in having similar cephalic setae, the amphid size, the head diameter, as well as the shape of the tail. However, *S. boudieri* sp. nov. can be distinguished from *S. profundus* by the length of the spear (23 μm vs 32 μm), the shape and the length of spicules (65 μm vs 79 μm) and absence of supplements. *S. auratus* has shorter body length (3 420-3 600 μm vs 6 500-6 850 μm in males) and much longer spear (35-40 μm vs 21-23 μm) and *S. smetti* has much shorter body length (1 787-2 414 μm vs 6 500-6 850 μm in males), which could separate them from the present new species. The main differentiating characters of the four species in the genus *Siphonolaimus* are given in Table 2.

Table 2 Main differentiating characters of the four close species in the genus *Siphonolaimus* (based on male).

Species	BL (μm)	Spear length (μm)	Sa (μm)	Sa / abd	Supplement	
					umber	shape
<i>S. auratus</i> Wieser	3 420-3 600	35-40	62	1. 5	26-30	—
<i>S. profundus</i>	4 680-5 980	32	79-83	1. 72-1. 84	32	Cup shaped
<i>S. smetti</i> Chen	1 787-2 414	40-45	54-55	1. 4-1. 6	4-8	Setose
<i>S. bouchieri</i> sp. nov.	6 500-6 850	21-23	61-65	1. 33	Absent	

Order Monhysterida
Family Siphonolaimidae

Genus *Siphonolaimus* De Man, 1893

Siphonolaimus profundus Warwick, 1973

Description and discussion. The present specimens are in all ways similar to the description of Warwick, 1973 except the ‘b’ value (16.1-21.6 in original description compared to 32.6-35.7 in the present specimens). But only one character is different we consider it is not enough to describe it as a different species. This is the first record in Chinese water.

Distribution. *Siphonolaimus profundus* was reported by Warwick R. M. in the South-east Arabian upwelling region of the Indian Ocean. This is the first record of *Siphonolaimus profundus* in Chinese waters.

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中国黄海与中国东海管咽线虫属 (线虫动物门) 一新种与一新纪录

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摘要 描述了中国黄海自由生活海洋线虫 1 新种 *Siphonolaimus bouchieri* sp. nov., *S. bouchieri* sp. nov. 的主要特征是: 口针短 (21~23 μm), 头直径为 10~11 μm, 圆形化感器直径为 13 μm, 与相应体直径的比例为 59%; 短交接刺

(61~65 μm, 为肛径的 1.33 倍), 无交接辅器; 尾巴圆锥形, 雄性尾巴为肛径的 3.57 倍, 雌性尾巴为肛径的 4.58 倍。同时, 描述了中国东海管咽线虫科的 1 新纪录, *Siphonolaimus profundus*。模式标本存放于中国海洋大学生命学院。

关键词 自由生活海洋线虫, 管咽线虫属, 新种, 黄海, 新纪录, 东海。

中图分类号 Q959.173